

TRANSLATION

from

ROTHA FULLFORD LEOPOLD

Translated by

Checked by

Typed by

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BCM BOX 6575  
LONDON WC1N 3XX  
ENGLAND

P.O. BOX 7  
WODEN, A.C.T.  
AUSTRALIA 2606

JAPANESE PATENT SPECIFICATION

No. 50-59312 (1975)

GRANULATION OF MALTITOL-CONTAINING MATTER BY SPRAY COOLING

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Inventor(s): K. Kazuaki et al.

Assignee: Nikken Kagaku K.K.

PATENT CLAIM

A method of granulating maltitol-containing matter by spray cooling, comprising admixing to said matter a small amount of at least one member of the group consisting of monosaccharides and monosaccharide alcohols, melting the composition in the absence of water, and spraying the molten composition into a cooled and dehumidified zone.

EXCERPTS FROM THE MAIN BODY OF THE SPECIFICATION

The sugar alcohol maltitol has a sweetness approaching that of cane sugar but remains substantially unabsorbed from the digestive tract when ingested. It is therefore of interest as a no-calorie sweetener.

For example as a coffee sweetener maltitol has the disadvantage of being extremely difficult to crystallize and to be highly hygroscopic.

The sugar is highly viscous in the molten state, has a low softening point (about  $40^{\circ}$ ) and is for this reason very difficult to prepare in pulverulent form by spray drying.

When an attempt is made to granulate anhydrous maltitol in the presence of other substances by spray cooling (for example maltitol melted at about  $150^{\circ}$  and 75 parts blended with 5 parts sorbitol and 20 parts of hydrogenated oligosaccharide) under  $2 \text{ kg/cm}^2$  pressure, the high viscosity makes granulation impossible. The viscous mass fails to atomize and forms a thread which may be several meters long. The viscosity cannot be appreciably depressed by heating at comparatively low temperatures, and at temperatures in the vicinity of  $200^{\circ}$  the sugar begins to decompose with discoloration and ultimate carbonization with gas evolution.

These inventors have made the surprising discovery that the viscosity of molten maltitol can be substantially depressed by admixture of a monosaccharide or of a monosaccharide alcohol, so that it is possible to spray the sugar in the molten state and to recover it in pulverulent form. The present invention is based on this discovery.

While the above maltitol composition has a viscosity of 30,000 cp at  $140^{\circ}$ , the addition of 10% monosaccharide

or alcohol depresses the viscosity at the same temperature to 9,000 cp. Atomization at this viscosity is readily achieved.

The invention can be reduced to practice by addition of a monosaccharide or monosaccharide alcohol to pure maltitol, but for reasons of economy it will generally be preferable to admix at least sorbitol in addition to the monosaccharide. Monosaccharides and their alcohols most suitable for the purpose of this invention are fructose, xylose, glucose, xylitol and sorbitol.

Because of the hygroscopicity of maltitol, it is necessary to carry out the spray cooling in an atmosphere substantially devoid of moisture. A spray temperature in the range 110-150° and a spray pressure of 1.5-3 kg/cm<sup>2</sup> provides the best conditions for reducing the invention to practice.

#### EXAMPLE 1

A composition comprising 75% maltitol, 5% sorbitol and 20% oligosaccharide hydrogenate was dissolved in water to 70% concentration, and 0.8 kg of the solution was mixed with 0.2 kg of a 70% sorbitol solution. The mixture was concentrated for 5 h at 120° under reduced pressure to a substantially, anhydrous state and the concentrate introduced into a jacketed spray nozzle and sprayed at a temperature of 140° and under pressure of 2 kg/cm<sup>2</sup> into the

top of a column of 3.5 m height and 1.8 m x 1.8 m sides maintained under relative humidity of 30% and at a temperature of 25°. From the bottom of the column 0.7 kg of pulverulent product was recovered.

#### EXAMPLE 2

A 70% solution of a maltitol composition as in Example 1 (1 kg) was concentrated under reduced pressure at 120° for 5 h and 0.1 kg of melted, anhydrous, pulverulent fructose admixed to the concentrate. The molten mixture was spray cooled as in Example 1 from a temperature of 110°. The spray pressure was 2 kg/cm<sup>2</sup>. From the bottom of the column 0.8 kg of pulverulent product was recovered.

#### EXAMPLE 3

A composition comprising 94.5% maltitol and 5.5% oligosaccharides was dissolved in water to 75% concentration and 1 kg of the solution concentrated under reduced pressure at 120° for 5 h. To the concentrate was admixed 0.15 kg of melted, anhydrous fructose at 110°. The mixture was spray cooled at 110° under 2 kg/cm<sup>2</sup> pressure and 0.9 kg of pulverulent product recovered from the bottom of the column.

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Granulation of maltitol - by mixing with small amt of monosaccharide and spraying in anhydrous molten state

Patent Assignee: NIKKEN CHEM CO LTD (NIKM )

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Abstract (Basic): JP 50059312 A

A compn. contg. maltitol was mixed with a small amt. of monosaccharide and sprayed in anhydrous molten state to give granules. In an example, 0.8 kg 70% aq. soln. of a mixt. of maltitol 75, sorbitol 5, and oligosaccharide 20% was mixed with 0.2 kg 70% aq. sorbitol, concd. in vacuo to dryness, and sprayed at 140 degrees/2 kg/cm2 into a cooling tower at 25 degrees and relative humidity 30% to give granules. Fructose was also used in place of sorbitol.

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